Senior Design Ideas

Team INASAD

Members:

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Agenda:

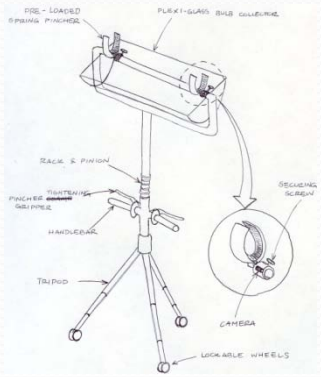
- Past Events
- Current Events
  - Full System Conceptual Designs
  - Patent Search
- Future Events
  - Selection Analysis

Past Events

- Group met and discussed full system conceptual designs.
- Conceptual design document was updated and design drawings were created
- Patent search was completed

Grip and Turn Tool

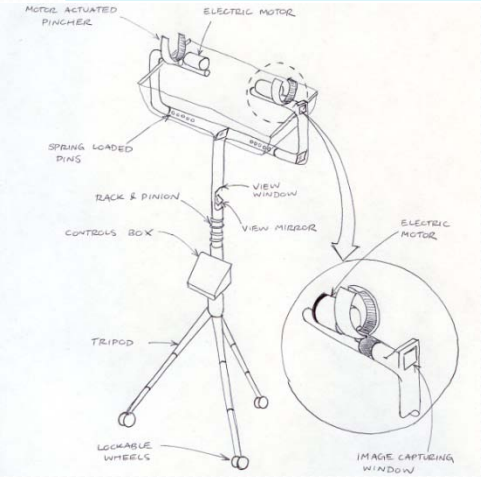
Advantages	Disadvantages
•Individual height legs	•Not many DOF
•Purely mechanical work	•Pull cables might get on the way when rising/lowering
•Light weight	•Horizontal range limited
	•Cannot operate over obstacles



Points of Interest
Clamps move along rod to adjust
Plexi glass provides added safety
Use of pull cables

Periscope Electric Tool

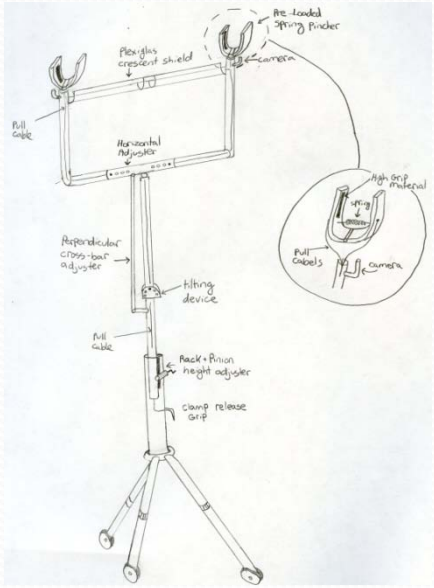
Advantages	Disadvantages
•Pincher grip fine adjustment	•Electric motors add weight
•Automatable gripping	•Not many DOF
•Implements reliability of motors	•More prone to breakage
•Individual height legs	•Cannot operate over obstacles



Points of Interest
U-shape adjusts to specific bulb length
Bag can be filled up with multiple bulbs before replacement

Bowing Tool

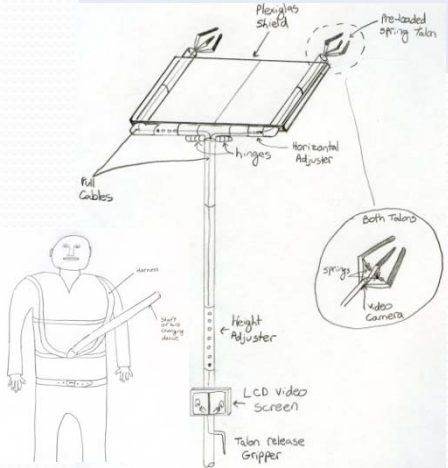
Advantages	Disadvantages
•Can be operated over obstacles	•More user physical work
•More DOF	•Twist angle usage not intuitive
•Individual height legs	•System can tip over with certain angles



Points of Interest
U-link rotates back and forth through angle
Tilting device
Perpendicular cross-bar adjuster

Hinge Supported Tool

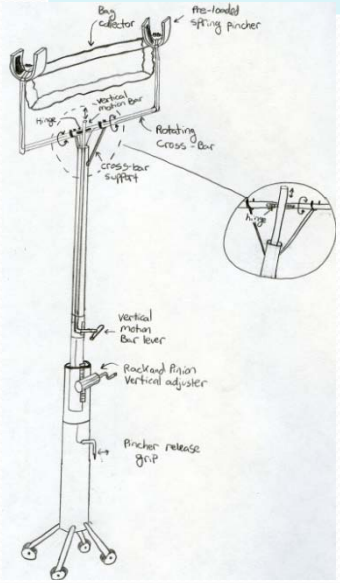
Advantages	Disadvantages
•Can be operated over obstacles	•More user physical work
•Bulb rotation provided by user as desired	•Attaching/detaching can get cumbersome
•More DOF	•Attaching/detaching can pinch fingers
•Can be used from base or at hand	



Points of Interest
Versatile usage
Hinge at base of U-link provides many DOF
Detaches from base

Push-rod Tool

Advantages	Disadvantages
•Individual height legs	•Limited rotation from bar
•Purely mechanical work	•Potential of breaking bulb
	•Potentially wobbly



Points of Interest
Easy bulb alignment (bulb guiding system)
Easy usage

Patent/Product Search

- U.S. Patent Office
- Thomas Register
- Google
- Part Distributors
  - McMaster-Carr
  - MSC
  - Grainger

Fluorescent Bulb Changing Devices

- Multiple searches were done to find a device in the same scope of the project.

Result:

RITE-O-GRIP

- Found: Better Lighting Ideas
- Product No.:60050
- Length 52” = 4’ 4”
- Cost: $63.41

Fluorescent Bulb Changing Devices

- Lessons Learned
  - Simple tool that works for up to 52”
  - Use as an option for clamping device.
  - Shows level that needs to be improved upon for further sales

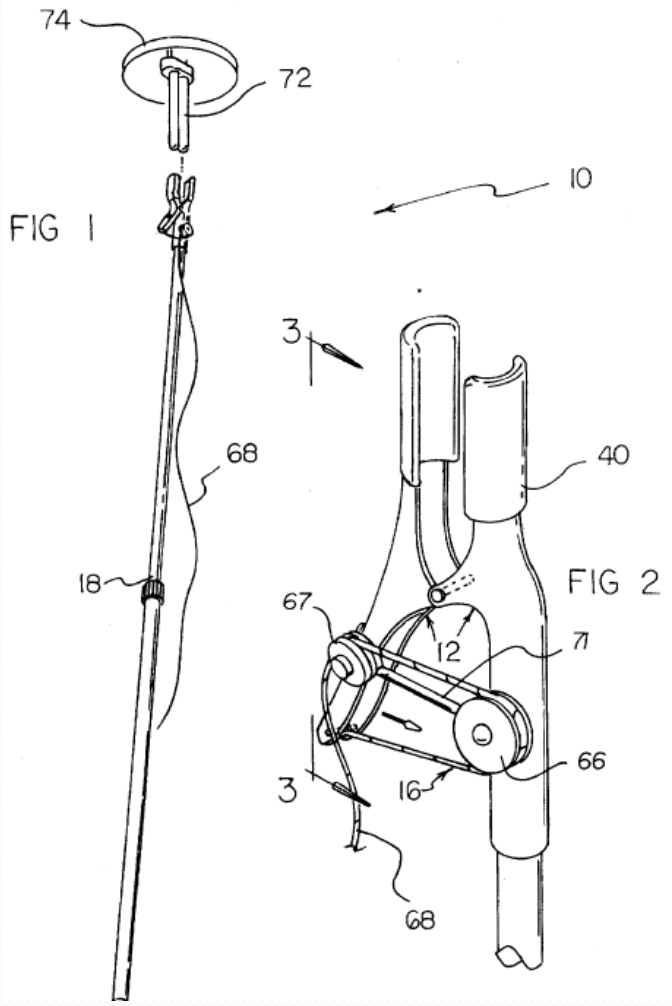
Fluorescent Bulb Changing Devices

Fluorescent Light Bulb Changing Device
Patent No. : US 5,730,033
March 24, 1998

Abstract:

•Device implementing gripper assembly to extract and replace vertically positioned fluorescent light tube

- Gripper assembly with jaw section
- Implements tension spring
- System of pulleys to open gripper

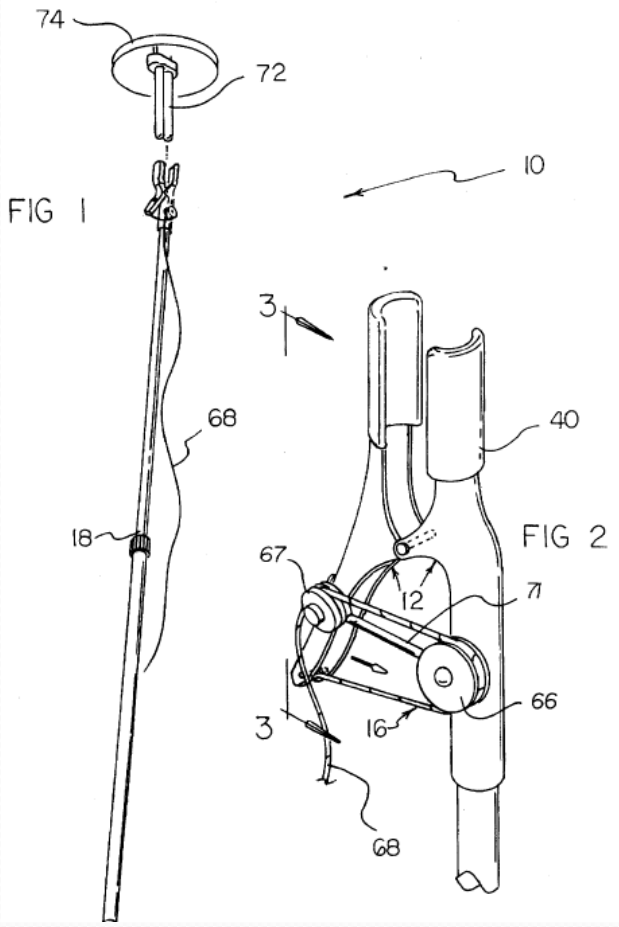


Fluorescent Bulb Changing Devices

Tool for Changing a Light Bulb
Patent No. : 7,334.503
February 26, 2008

Lesson Learned:

- Pre-loaded tension spring concept
- System of pull cables can be mimicked



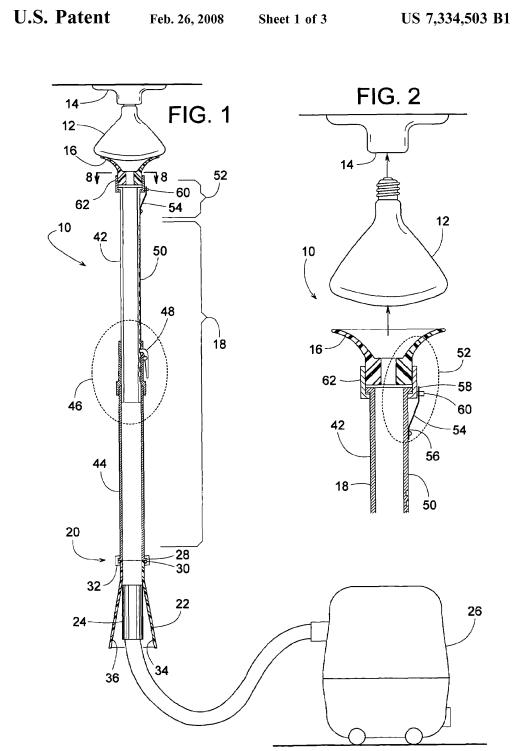
Fluorescent Bulb Changing Devices

Tool for Changing a Light Bulb
Patent No. : 7,334.503
February 26, 2008

Abstract:

•A light bulb changing tool is adapted for use with a conventional vacuum cleaner

- Suction nozzle is of an indeterminate diameter.
- Includes a rotational slip joint that enables the tool to be rotated
- Includes a torque-limiting coupling

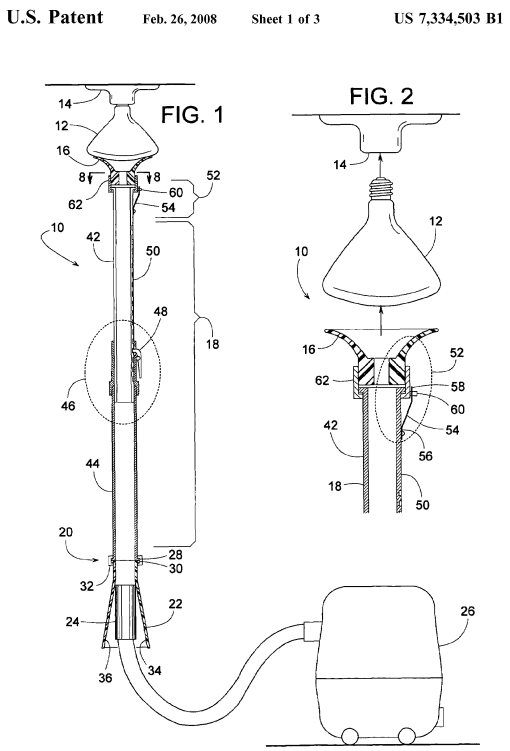


Fluorescent Bulb Changing Devices

Tool for Changing a Light Bulb
Patent No. : 7,334.503
February 26, 2008

Lesson Learned:

•Something other than clamps could be used for removal.

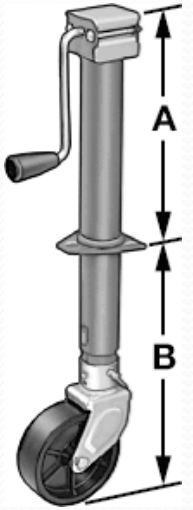


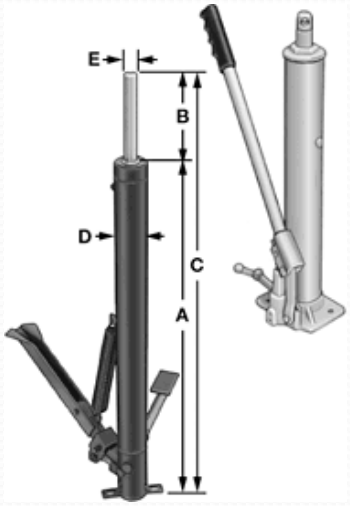
Raising/Lowering Subsystem

Name	stand?	Min Height	Max Height	Travel (in)	Cost	Feasible?	Other
Spring-loaded button rod	no			60	$28.70		5' poles, could be modified to telescope
Stand Light,500 W (twist lock)	yes	40	84	44	$57.20		light adds cost
Aluminum tripod	yes	26	57.5	31.5	$40.00		foldable
Base/cart (bar knob)	yes	63	98	35	$284.00		has usable wheels
Pedestal base	yes	56	92	36	$214.50		
Jack stands	yes	15	24	9		**No**	Not enough travel
Auxiliary Stand, Heavy Duty	yes	53.375	79	25.625	$133.50		3/4 ton capacity
Tilt stand	yes	28	42	14	$273.50		lockable casters
Manual Positioner	no			18	$3,222.00	**No**	
Ball screw jack	no			72	$518.70	**No**	Precise
Acme screw jack	no			36	$499.64		5 ton capacity
High-Lift Ratchet Jacks	yes	4.5	49.75	45.25	$90.68		would need to be applied on 2 sides
Top crank jack	no			15	$53.88		raises side
Rack and pinion jack w/ caster	no			16	$75.53		
Heavy duty tripod	Yes	38	65	27	$111.63		can be found cheaper
Linear Actuator	no			36	$384.45		powered by 12 VDC
Hydraulic cylinders	no			12	$284.16	**No**	many added costs
Air cylinders	no			28	$114.89		compressor, tank needed
Rodless air cylinders	no			36	$440.43	**No**	
High-Lift Hydraulic Jacks	yes	38	69	31	$473.85		foot operated
Telescopic bottle jack	no			12	$289.01		handle operated

Raising/Lowering Subsystem

- Lessons Learned
  - Hydraulics and pneumatics
    - Difficult due to cost restrictions and need for space.
  - Travel varies per system, but must meet a minimum requirement ruling out certain systems.
  - Commercial of the shelf (COTS) items
    - Many usable options with little or no modifications.





Visual Subsystem

Name	Cost	Other
Audiovox ACA450 Rear-view System	$ 299.99	camera & monitor
XOVision 2.5" LCD Monitor w/ Back-Up Camera - RM800HT	$ 79.99	camera & monitor
BOSS AUDIO CAM10 MINI REAR VIEW CAMERA	$ 28.30	RCA connection cam
Clip-On Mirror w/ 7" Monitor	$ 80.28	mirror/ monitor
jWIN JVTV2040 5 1/2" B&W	$ 49.58	cheap camera & monitor
SVAT Electronics GX5204 Wireless handheld Sec System	$ 160.99	wireless cam/ battery
Q-See QSVOSB Security Camera and Monitor	$ 63.03	2 camera & monitor
Dog camera	$ 81.60	its just wrong
VR3 Backup Parking Sensor	$ 39.99	sound alert system

Visual Subsystem

- Lessons Learned:
  - Camera system will present a significant cost
  - Camera systems come with a screen or use RCA cables
  - Monitor Type
    - Would increase space used and increase weight of product
  - Sound location system could be used in replacement of visual system

Clamping Subsystem

Spring Action Scooper

Manufacturing Part No.: 91824

Abstract:

Used to collect pet waste. Weighs less than 1 pound and is hand operated.

Clamping Subsystem

Spring Action Scooper

Manufacturing Part No.: 91824

Lesson Learned:

- Alternative of control system
- Example of how to connect clamping device to hand held controls
- Material choice – light weight, high impact plastic

Clamping Subsystem

Trash Picker

Manufacturer: Cpower Tools Co. Ltd

Model No.: CP-042

Abstract:

Used to collect litter off the ground. Also can be used to grab things off of high shelves and behind appliances in hard to reach places.

Clamping Subsystem

Trash Picker

Manufacturer: Cpower Tools Co. Ltd

Model No.: CP-042

Lessons Learned:

- Alternative Clamping system

- Control system

Future

- Selection analysis will be performed systematically

- Design will be selected from analysis

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Fluorescent Light Changing System